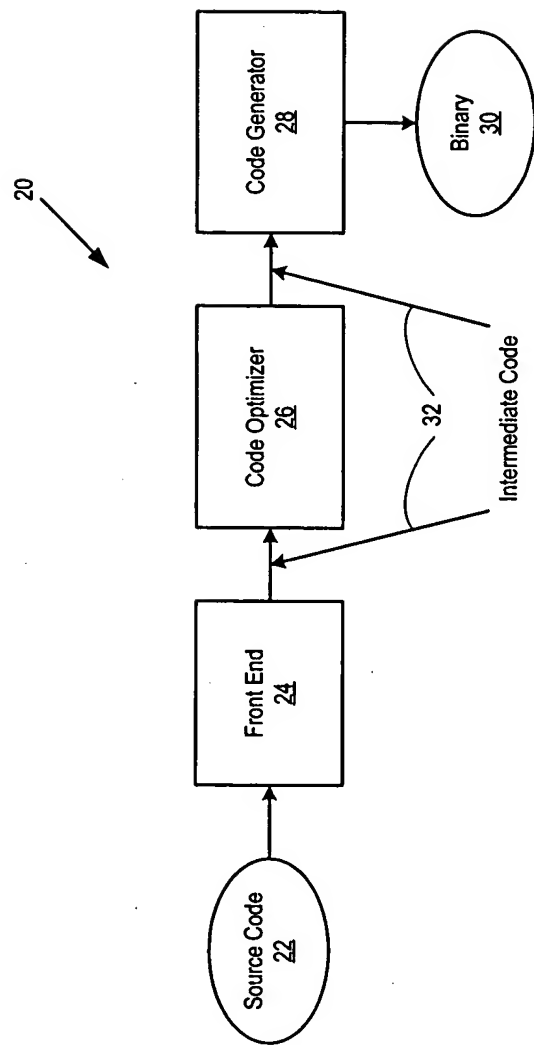


Figure 1



OPTIMIZING COMPILER

Figure 2

Fig 3. Compilation Process of Profile-Directed Optimizations

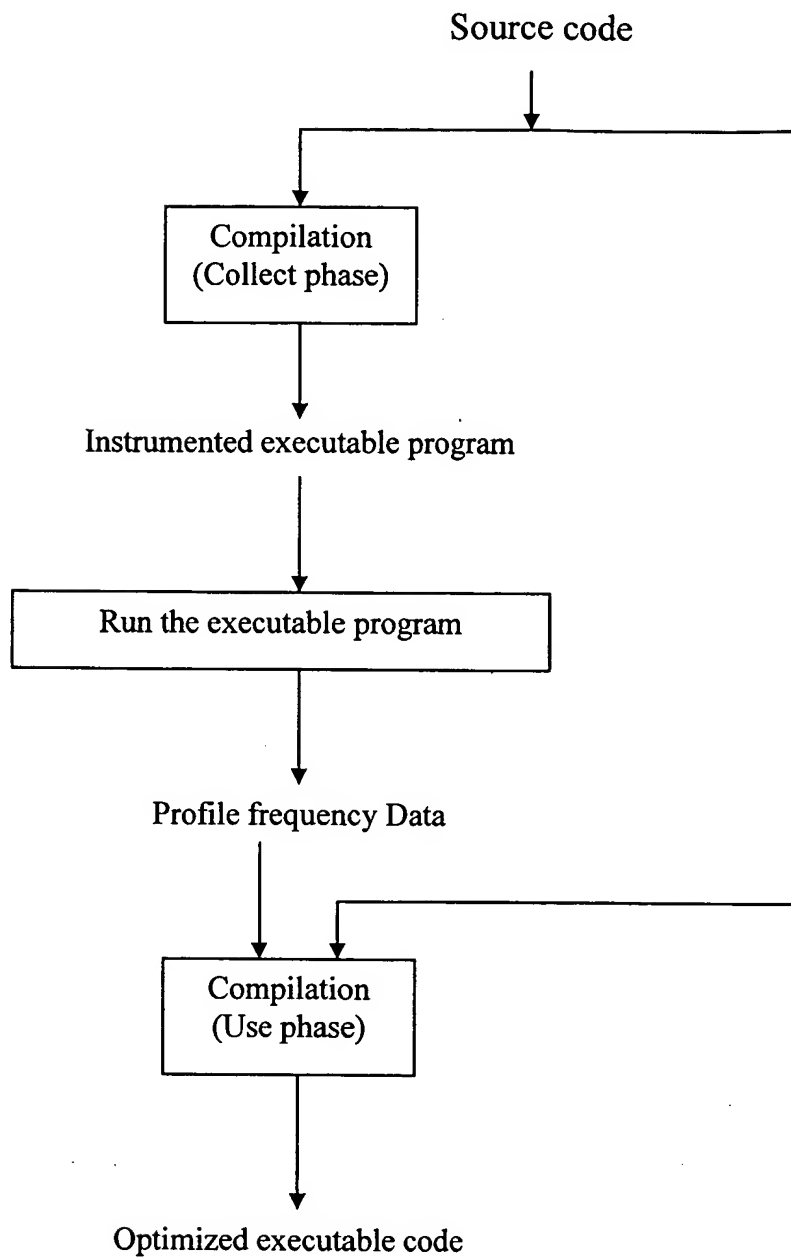


Fig 4. Compiler Components: collect phase and use phase (prior art)

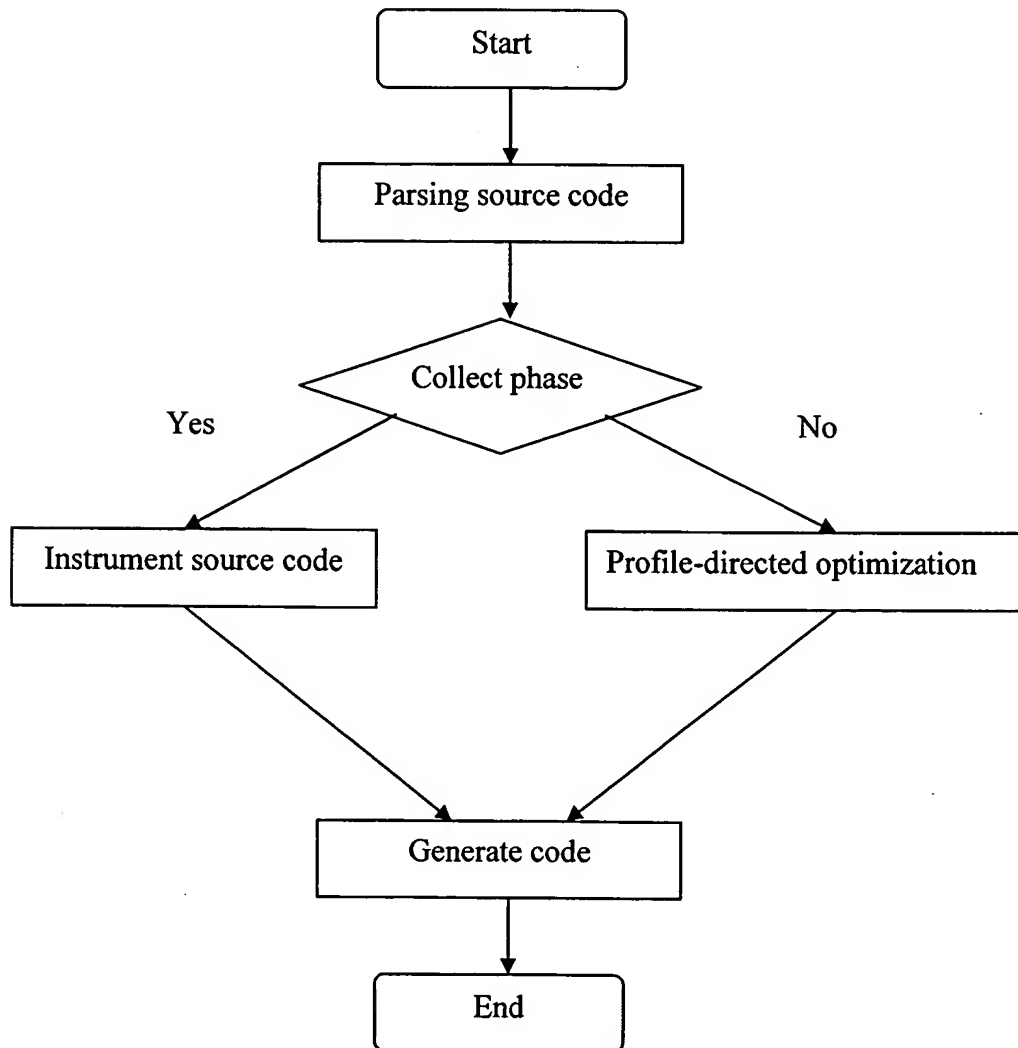


Fig. 5 Frequency change before and after inlining

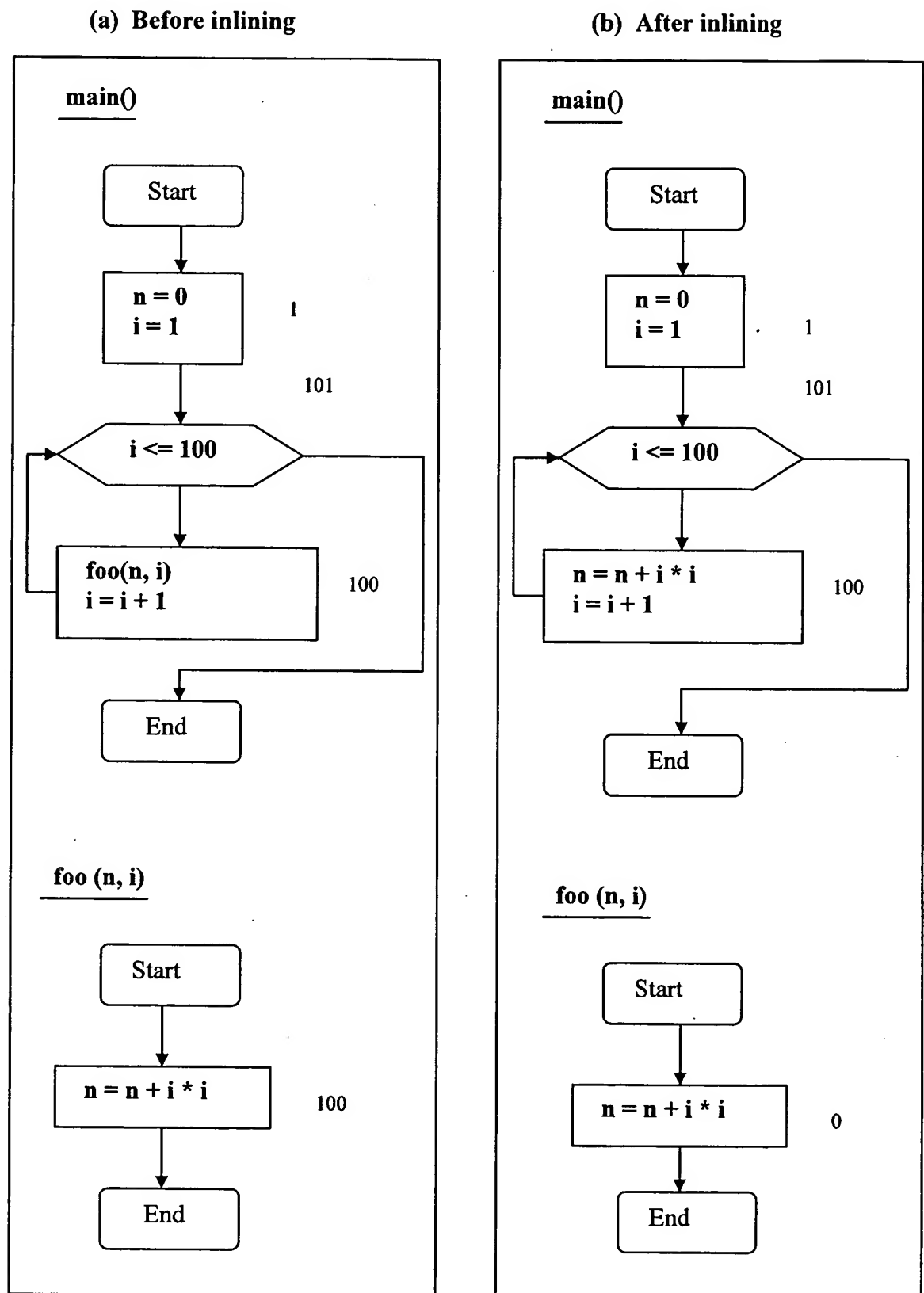


Fig 6. Profile-Directed Optimizations (PDO) (prior art)

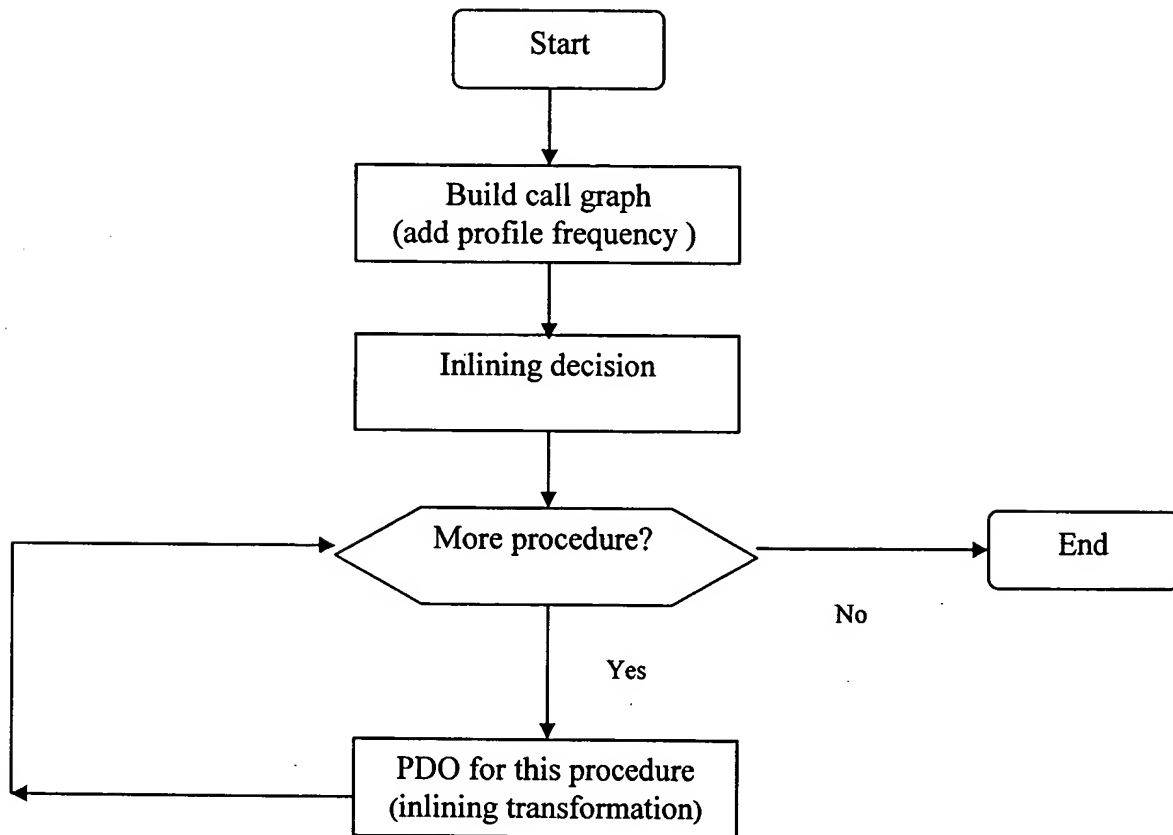


Fig 7. Example of Call graph and IP

Fig 7(a) Original Code

```
foo() {  
  c1: bar(1);  
  c2: bar(3);  
}  
  
bar(n) {  
  c3: cat(n);  
  c4: cat(n+1);  
}  
  
cat (m) {  
  <body of cat(m)>  
}
```

Fig 7(b) After Inlining

```
Foo() {  
  <body of cat(1)>  
  <body of cat(2)>  
  c3_2: cat(3)  
  <body of cat(4)>  
}  
  
bar(n) {  
  cat(n);  
  cat(n+1);  
}  
  
cat (m) {  
  <body of cat(m)>  
}
```

Fig 7(c) Call Graph

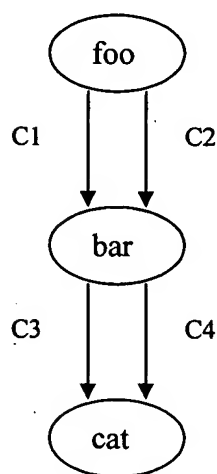


Fig 7(d) IP(foo)

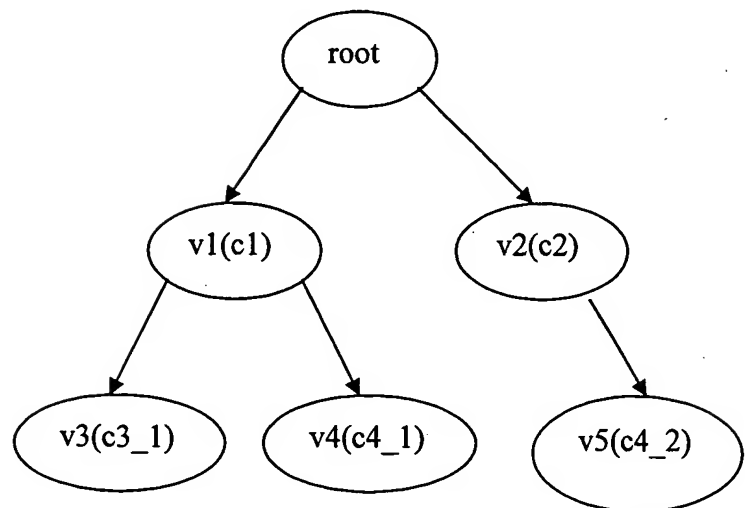


Fig. 8 Inlining Original Procedures

Fig. 8(a) Original Procedures

Fig. 8(a) Original Procedures

<pre>main () { foo(); }</pre>	<pre>foo() { bar(); }</pre>	<pre>bar () { }</pre>
---	---	--------------------------------

Fig. 8(b) Inlining original bar into foo

<pre>main () { foo(); }</pre>	<pre>foo() { }</pre>	<pre>bar () { }</pre>
---	-------------------------------	--------------------------------

Fig. 8(c) Inlining original foo into main

<pre>main () { bar(); }</pre>	<pre>foo() { }</pre>	<pre>bar () { }</pre>
---	-------------------------------	--------------------------------

FIG. 9 Updating Frequency

```
proc {  
  e;  freq(e)  
}
```

Fig 9(a)

```
callee(e) { freq(e) ↓  
  e1;  a1 ↓  
}
```

Fig 9(b)

```
callee(e1) { a1 ↑  
  e2;  a2 ↑  
}
```

Fig 9(c)

```
Callee(e2) { a2 ↓  
}
```

Fig 9(d)

Fig. 10 Example of Applying the Algorithm

Fig. 10(a) Original procedures (frequency is number after colon)

proc() { :1 e1: foo() : 1 e2: bar() : 1 }	foo() { :1 for (i=0; i<100;i++) e3: bar() : 100 }	bar() { :101 e4: cat() : 101 }	cat() { :101 }
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Fig. 10(b) Inlining e3 into foo

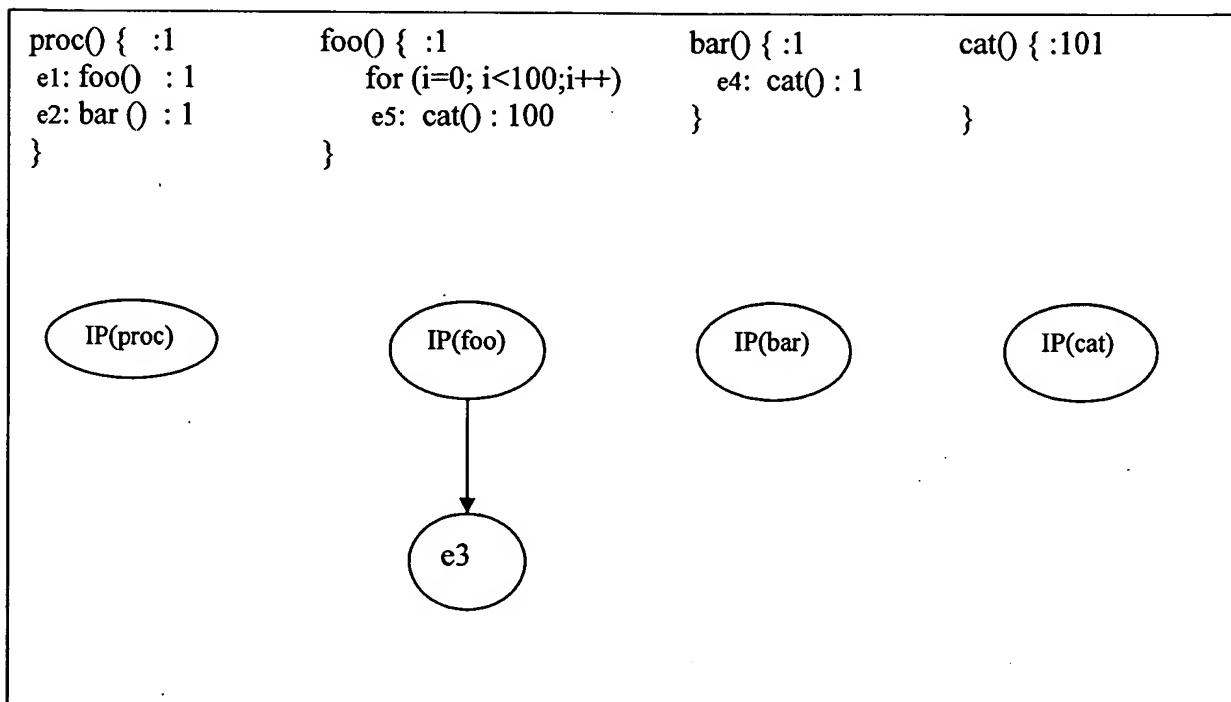


Fig. 10(c) Inlining e4 into bar

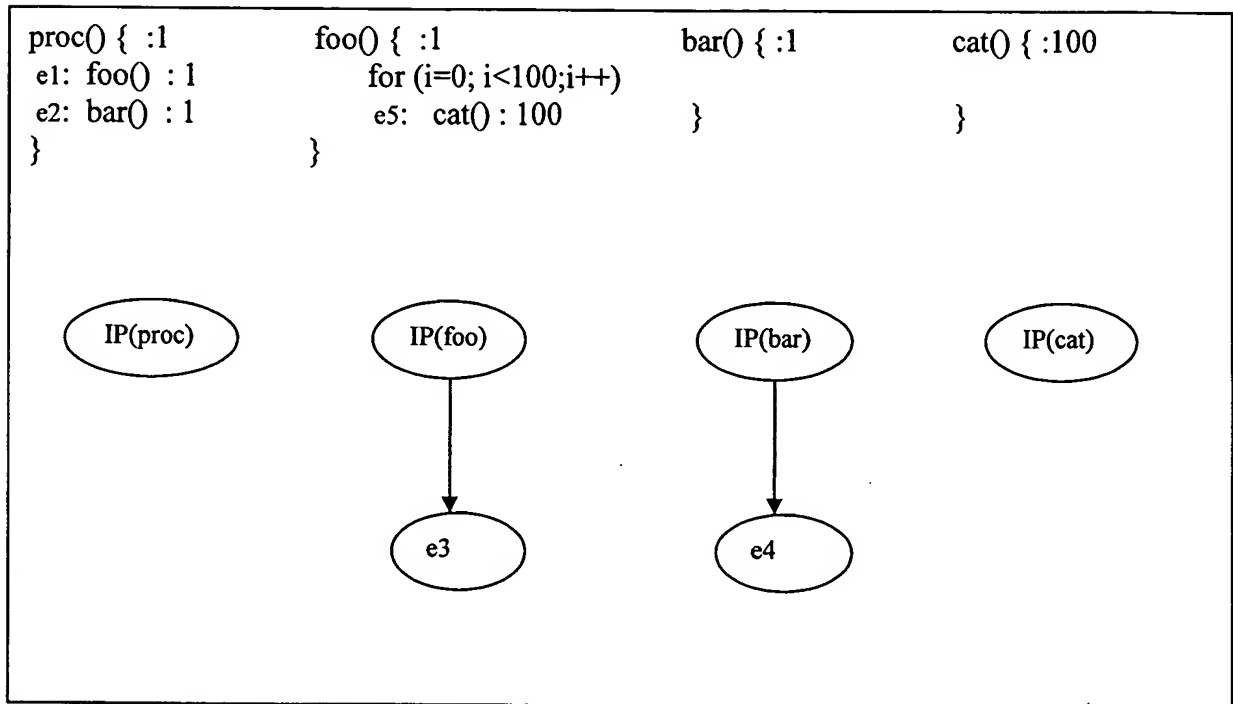


Fig. 10(d) Inlining e1 into proc

